**ITA 3: Problem Solving Methodology and Database software**

**Chapter 2, developing a solution using database software, p 43 -**

**Problem-Solving Methodology, databases contd.**

**Design the Solution**

**Database Design Tools**

The design tools for a database are:

* Structure tables
* Query designs
* Mock-ups
* Layout diagrams for input forms and reports
* Flow charts

The data structure table shows a developer the name, data type and size of each field in a table or cell in a worksheet. Database tables cannot hold formulas.

Fig. 2-5A.

**Customer table**

|  |
| --- |
| CustomerID\* |
| Lastname |
| Firstname |
| Address |
| Suburb |
| Postcode |
| Phone |

**Quote table**

|  |
| --- |
| Quote\_Num\* |
| CustomerID |
| Size |
| Cost-Materials |
| Cost\_labour |
| Colour |
| Job\_date |
| Account\_Paid |

**\***Primary key

Naming Conventions; the commonly accepted conventions are that the document should have a meaningful name, but so should all the elements inside the file. Names of tables should reflect the types of records that they contain. Fields should have short but descriptive names, without spaces, for example lastname of last\_name. If it is a query a (Q) should be put behind the name so that we know that it is a query.

**Query Design**

By setting a field size to integer it allows only whole numbers to be entered. If the field were to include decimal places, the field size would be set to single. It also uses less storage space (2 bytes) than a number specified to single (4 bytes)

**Layout Diagram**

The layout diagram involves sketching what an input form or output, of the solution would look like. It shows the location of elements such as headings, tables and fields. It is based on the appropriate formats and conventions.

The layout diagram involves an annotated diagram to all the details such as font type, size and style and options for the lists. Like other design elements, layout diagrams are usually done by hand, although pre-printed templates can be used.

As well as the above examples the essential elements that are specific to reports are including the organisation’s details and date in the report header, grouping and summary statistics.

**Test Data**

The purpose of test data is to ensure that the solution is functioning properly. The test data should test all aspects of the solution, including identification and handling of incorrect data.

The test plan is used to show the functions to be tested, the sample data and how the function is expected to handle the data.

**Flow Charts**

The role of the flow chart is to graphically represent, in logical order, the steps required to create the solution. Each step is written inside a shape.

The common draw tools that are used are:

Decision

Flow of the solution

Process

Input or output of data

**Characteristics of effective user interfaces, p 184-188**

The user interface is where the user interacts with the information system. The layout diagram plans the appearance of on-screen output.

High quality user interfaces take into account usability and accessibility. Take brief notes relating to:

**Usability**

**Transparency**- the user does not really notice the interface itself- it is so easy to use that the user interacts with it intuitively.

**Font selection-** two fonts should be used, one for the heading and one for the body of the product. Serif fonts should be used for the body, as they contain letters with tails and are much easier to read. A font that has no tail should be used for the heading as this is easier to read in larger fonts and for small spaces of writing. The document will be made confusing if there are too many fonts on the one page.

**Accessibility**

**Find information easily**- A user should be able to fins what they need quickly and interact with it in a straightforward way. Each button needs to be clear about what they go to to save frustration.

**Instructions for navigating help files-** Onscreen products should use conventional navigation symbols, such as a question mark for help, a house symbol for home or backwards and forwards arrows to go to previous or next pages.

**Consistent navigation-** so that throughout the whole site the buttons can be used and any page can be accessed by using the button.

**Appropriate and relevant information according to audience.**

**Develop the Solution, p 50**

In this stage the various elements of the database is constructed. This stage involves:

Purchasing hardware and software

Construct the tables

Queries

Input forms

Reports

Macros

Programming

**Validating Data**

Manual validation requires the data entry operator to proofread the data they have entered to ensure its accuracy, completeness and reasonableness. Whereas electronic validation relies on software functions to perform checks on accuracy, completeness and reasonableness.

The types of electronic validation available in databases:

* Range checks
* Spellchecking
* Grammar checking
* Data type check
* Input mask
* alignment

An input mask is used to reduce the chance that invalid data is entered. It controls how the data can be displayed and entered.

The validation options in Filemaker pro are:

* ranges between certain numbers
* unique values

**Testing the Solution and Output**

Testing is carried out to ensure that all features and functions work correctly and that the information is free from errors.

The four types of testing are:

**Informal:** as software developers create the solution, they are constantly tested to see if the solution does what it is meant to.

**Formal:** testing the overall solution after it has been completed to see if it solves the problem. This test is formalised by documentation and each result of the test.

**Bench test:** sample data which would have been developed during the design stage, is used to determine how the solution behaves with a range of data. Data is chosen to see weather calculations are preformed correctly and how enormous data is handled by validation techniques.

**User acceptance testing**

**Testing validation**

The validation is tested to ensure that the data is accurate before data is entered via forms or queries are run.

**Testing the query**

The test data that should be chosen to test the query to ensure that it works correctly. It needs to be tested so that the records can be sorted into whether they are accepted or rejected. The formulas need to be checked here also.

**Documentation to support Solutions**

Documentation involves creating step-by-step instructions for users to work with the solution. This establishes the procedures that are necessary to allow the system to run efficiently.

The different types of Electronic documentation are:

* help files within the system of online documentation via:
* Internet

Hard copy documentations are:

* Booklets
* Quick reference cards
* Posters
* Technical manuals
* Training manuals
* Printed materials

The most important consideration in creating user documentation is that it meets the specific needs and level of experience of the user and can be in electric and hard copy form.

The type of documentation that technicians used is very detailed technical manuals because they need to know how to do everything with updating the system.

The type of documentation that people people who only access the system infrequently needs reminders of how to operate the system, which reference to pamphlets and quick reference guides.

**Implementation**

The key component of implementation involves the replacement of previous practises with the new solution and associated procedures. The key component is the establishment of training strategies for the user of the system.

The strategy that Anna used to train staff at the Ralph’s Roofing was that she showed the administration officer how to input new data and edit existing record. The staff are then aloud to get used to the system before the old system is removed.

**Evaluation**

**Evaluating the efficiency and effectiveness of the solution.**

The evaluation step involves the efficiency of the solution and the effectiveness of the output (the reports). It usually takes place after the solution has been implemented for a period of time, often about 6 months. The effectiveness relates to weather it has meet the systems goals. The tools that are used for the evaluation are surveys, interviews and direct observation of work practises.

What tools are used for the evaluation?

**Capabilities and limitations of DMS.**

Capabilities refers to how well a piece of hardware or software performs its functions

Capabilities, sort, query, macros

Capabilities, refer to notes on relational databases

Limitations of DBMS

* Relative to spreadsheets it is better for storing and querying and reporting, although calculations are undertaken
* Refer to notes flat file Vs relational DBMS

**Test Your Knowledge:**

1. An example of a data structure diagram involving two tables of data that have a one-to-many relationship is several workers sharing a single telephone extenision. Each extension is related to several employees’ records
2. A many-to-many relationship might exist in a school where each student studies many subjects and each subject has lots of students.
3. A customer’s name is not a suitable field for a primary key because
4. A suitable input form for the quote and job completition information for Ralph’s Roofing:

13. The bench test is used to determine how the solution would behave with a range of test data.

14. The features that make a document user-friendly are that the headings are in writing with no tails and the other writing is a font with tails to make it easy to read.